

REMARKS

This responds to the Office Action mailed on October 19, 2005.

Claims 1-17 are now pending in this application.

§102 Rejection of the Claims

Claims 1, 3 and 7 were rejected under 35 USC § 102(e) as being anticipated by Ng (U.S. 5,994,217). Applicant respectfully traverses this rejection and requests the Office to consider the following.

“A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” (*Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987), M.P.E.P. §2131, 8th Ed., Rev. 1).

Claim 1 requires, among others

forming a conductive first diffusion barrier layer above and on the first interconnect ...

These claim limitations therefore require that the conductive first diffusion barrier layer be both above, and on, the first interconnect.

Applicant has read and understood the Final Office Action. In response to the Final Office Action and the *Response to Arguments* (Office Action at page 4), Applicant respectfully asserts that Ng teaches a TiN barrier layer 28, but it is not formed above and on the Al-Si-Cu interconnect, which must be read as the first interconnect (required by Applicant's claim 1). Instead, the TiN barrier layer 28 is *below* and on the Al-Si-Cu interconnect. Because Applicant claims a process in claim 1, this is not an anticipatory teaching by Ng. Ng does not teach how the Al-Si-Cu structure (contact) at the level of layer 20 is formed. In any event, when the metal layer 28 is formed it is neither formed above and on an interconnect, nor below and on. Rather as to teaching a process, Ng merely teaches, if at all, forming an interconnect on layer 28. And the sequence Ng is also not enabling since as claim 1 requires forming the conductive first diffusion barrier layer above and on the first interconnect.

Indeed, the only teaching of an etch that breaches layer 28 is given at column 4, lines 61-62: “the metal layer 28 32 34 is etched using chlorine containing gas” Ng does not teach forming the recess into which is located the Al-Si-Cu structure at the level of layer 20. Ng is therefore devoid of any enabling teaching. One cannot determine whether the layer 28 is formed above and on the Al-Si-Cu structure, followed by an etch. Neither can one determine whether the layer 28 is formed immediately following the formation of layer 24, in which case layer 28 would coat layer 24 in the recess in which is located the Al-Si-Cu structure. FIG. 6 in Ng is also indefinite because layer 28 has no boundary definition coplanar with the Al-Si-Cu structure. Because Ng is not enabled to teach the chronological formation of the layer 28, Ng cannot be enabled to teach “forming a conductive first diffusion barrier layer above and on the first interconnect” (Claim 1). Because Ng does not anticipate claim 1, withdrawal of the rejections is respectfully requested.

The Office Action has a statement at the bottom of page 2 that is difficult to understand. It states, “[c]learly, in figure 6, the contact is formed in each of the ILD’s to expose the barrier layer (sic)” Because the phrase ends without punctuation, it is not clear to Applicant’s counsel if the phrase was intended to end with the word “layer”. And the assertion is not germane to the limitation of claim 1 of a method to “expose the first conductive diffusion barrier layer” because in Ng, the upper via can only expose layer 34, not the “first conductive diffusion barrier layer”. Withdrawal of the rejections is respectfully requested.

Claims 3 and 7 depend from claim 1. Because Ng does not anticipate claim 1, Ng also does not anticipate claims 3 and 7. Withdrawal of the rejections is respectfully requested.

§103 Rejection of the Claims

Claims 2, 4-6, and 8-17 were rejected under 35 USC § 103(a) as being unpatentable over Ng. Applicant respectfully traverses the rejection and requests the Office to consider the following.

To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the

knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (M.P.E.P. § 2143 8th Ed, Rev.1).

Applicant has read and understood the Final Office Action. The Final Office Action admits that “Ng lacks anticipation only in not teaching that an organic ILD may be used and that the barrier layers may be formed by electroless plating.” (Office Action at page 3). That the Office Action asserts that “Ng suggests that the metal layers may be formed by other metal processes” (Office Action at page 4), represents a non-enabling invitation to experiment. Since all the elements the claims are admitted not to be found in the cited reference, and since the rejection is based upon a single-reference action, Applicant assumes that the Office is taking official notice of the missing elements from an undisclosed source. Applicant respectfully objects to the taking of official notice, and pursuant to M.P.E.P. § 2144.03, Applicant traverses the assertion of official notice and requests that the Office cite a reference that teaches the missing element. If the Office cannot cite a reference that teaches the missing element, applicant respectfully requests that the Office provide an affidavit that describes how the missing element is present in the prior art. If the Office cannot cite a reference or provide an affidavit, Applicant requests withdrawal of the rejections.

Conclusion

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney, John Greaves at (801) 278-9171 or the below signed attorney to facilitate prosecution of this application.

RESPONSE UNDER 37 C.F.R. 1.116 – EXPEDITED PROCEDURE

Serial Number: 10/635,892

Filing Date: August 5, 2003

Title: SEMICONDUCTOR DEVICE USING AN INTERCONNECT

Assignee: Intel Corporation

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If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully submitted,

JIHPERNG LEU ET AL.

By their Representatives,
SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A.
Attorneys for Intel Corporation
P.O. Box 2938
Minneapolis, Minnesota 55402
(612) 349-9592

Date Feb. 21, 2006

By Ann M. McCrackin
Ann M. McCrackin
Reg. No. 42,858

CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this 21st day of February 2006.

Chris Hammond

Name

Chris Hammond

Signature